Does Heparin-bonding Improve Results of Viabahn-Assisted Subintimal Recanalization for TransAtlantic Inter-Society Consensus D Femoropopliteal Artery Disease

Michael J. Verta, MD, Nilesh H. Patel, MD, Stanley Kim, MD, and Joseph R. Schneider, MD. Vascular and Interventional Program, Winfield, Ill

Objectives: This study assessed if heparin bonding improves patency of subintimal recanalization of TransAtlantic Inter-Society Consensus (TASC) D femoropopliteal disease using Viabahn stents.

Methods: We compared patients receiving standard (group I, n = 20) or heparin-bonded (group II, n = 19) expanded polytetrafluoroethylene-covered stents for Viabahn-assisted subintimal recanalization (VASIR) of severe (TASC D) femoropopliteal artery occlusive disease. Demographics, comorbidities, presenting symptoms, treated length, improvement in ankle-brachial index (ABI), patency assessed by ABI and duplex imaging, and length of follow-up were examined.

Results: The age difference between groups was not significant in group I (70.7 ± 12.1 years) vs group II (64.8 ± 13.9 years), nor were differences in sex (M/F: 9/9 vs 8/8, respectively), comorbidities, or presenting symptoms. Although the treated length of artery was slightly greater in group II (29.9 ± 10.8 vs 32.4 ± 4.5 cm, $P = .016$), improvement in ABI was similar in group I (0.41 ± 0.16) vs group II (0.51 ± 0.17), as was mean length of follow-up (18.3 ± 6.3 vs 18.2 ± 6.0 months, respectively). Although life-table 1-year primary patency was not significantly different between the two groups (group I, 68%; group II, 79%; log-rank $P = .62$), assisted primary (group I, 73%; group II, 89%; $P = .11$) and secondary patency (group I, 71%; group II, 89%, $P = .21$) tended to be greater in group II vs group I, primarily because of fewer early thrombotic failures in group II. However, some 5-mm grafts were used early on in group I only, and with these grafts excluded, the patency differences between groups I and II were minimal, suggesting no benefit to heparin-bonding for grafts >6 mm ($P > .49$ for primary, assisted primary, and secondary patency). Notably, patencies in both groups were similar to those reported for above-knee expanded polytetrafluoroethylene bypass.

Conclusions: Heparin-bonding does not appear to improve patency in VASIR compared with standard Viabahn stent grafts, making it difficult to justify the added expense; but maintaining patency in a failing graft to allow timely salvage intervention may be an important benefit, particularly in smaller-diameter grafts. Patient selection may be a more important predictor of success than heparin bonding. This preliminary study with small sample sizes requires larger samples and longer follow-up to further explore the role of heparin-bonded grafts in VASIR.

Endovascular Management of Ruptured/Leaking Descending Thoracic and Visceral Aortic Aneurysms Using Branch Snorkels Technique

Mel J. Sharafuddin, MD, Raphael C. Sun, MD, Adonis J. Lysandrou, MD, Parth B. Amin, MD, Rachael M. Nicholson, MD, William J. Sharp, MD, and Timothy F. Kresowik, MD. Department of Surgery, University of Iowa College of Medicine, Iowa City, Iowa

Objectives: This study describes our experience with using the visceral branch snorkel technique to allow emergency endovascular repair of ruptured descending thoracic or visceral aortic aneurysms.

Methods: Since February 2011, we have treated three patients with ruptured or leaking aortic aneurysms with visceral involvement. All were hemodynamically compensated, with two patients requiring pressors support. Prophylactic spinal drainage was performed in one patient who had prior open abdominal aortic aneurysm repair. All three procedures were technically successful and all had resolution of their symptoms and were discharged home.

Results: The first treated patient, presenting with the combination of an infrarenal aortic aneurysm and a leaking saccular aneurysm of the pararenal aorta, was managed with an Excluder bifurcated stent graft with an aortic cuff extension into the suprarenal segment in conjunction with two retrograde renal artery snorkels. On follow-up 3 months later, enlargement of the saccular aneurysm was noted without demonstrable endoleak, and a mycotic pathology was suspected. He died in hospice care 6 months after the procedure. The second patient presented with a ruptured type V descending thoracic aortic aneurysm. He had a prior open repair of a juxtarenal abdominal aortic aneurysm with a short intervening nonaneurysmal pararenal zone. His thoracic aneurysm was excluded using two overlapped TAG stent grafts, in conjunction with three visceral snorkels (two long retrograde snorkels to the CA and SMA, and one short retrograde snorkel to the right renal artery; Fig). The third patient, presenting with a leaking aneurysm related to giant renal artery stumps, was treated with a TAG stent graft in conjunction with two antegrade visceral snorkels (CA and SMA). Both patients are doing well on follow-up, with a small type II endoleak noted in the first one.

Conclusions: Endovascular exclusion of ruptured aortic pathologies in conjunction with snorkel visceral branch revascularization offers the advantages of simplicity, customizability to individual scenarios, and reliance on readily available off-the-shelf components. However, it requires advanced endovascular skills and experience. It may represent a reasonable option where fenestrated or branch stent graft technologies are unavailable.

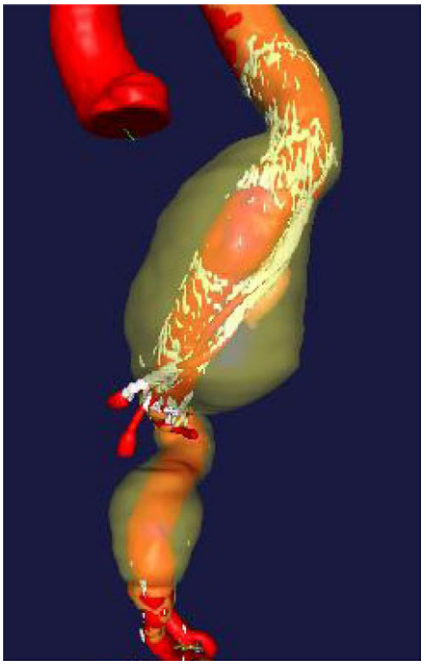

Fig.

Open Vascular Surgery Experience for the General Surgery Resident in the New Millennium

Adam Rothermel, MD, Jarom Lamb, MD, Harish Yalamanchili, MD, Jantzen Thorns, MD, and Charles Holden, MD. Vascular Surgery, Mount Carmel Hospital, Columbus, Ohio

Objectives: A significant shift in the exposure of general surgery residents to vascular cases has occurred during the last decade. In light of an increasing number of endovascular surgeries and the restrictions of the 80-hour workweek, there is anecdotal concern that general surgery residents may not receive adequate exposure to index vascular cases. To examine actual vascular operative volumes for chief residents, a retrospective review of case logs was conducted.

Methods: The case logs of chief residents from 2000 to 2011 were reviewed for the total number of carotid endarterectomies, femoropopliteal/tibial bypasses, and open aortic surgeries. The total number of these cases performed at our community hospital was also evaluated. Trends in total numbers of these surgeries were evaluated, with close attention to operative volume at the inception of duty-hour restrictions.

Results: Total number of carotid endarterectomies, femoropopliteal bypass, and open aortic surgeries performed at our hospital decreased by 55%, 30%, and 71%, respectively, from 2000 to 2011. Despite this, the overall exposure of residents to these vascular cases did not decrease significantly during this time. The average resident exposure to carotid endarterectomies and femoropopliteal bypasses did not significantly change from 2000 to 2011. However, resident exposure to open aortic cases was significantly decreased.

Conclusions: Total resident exposure to open vascular cases has not significantly decreased despite the introduction of the 80-hour workweek and the increase in endovascular cases. Open aortic surgeries have decreased overall at our institution, as has resident exposure to these surgeries. Despite ongoing changes in the field of vascular surgery and in resident restrictions, open vascular surgical exposure remains an important and vital aspect to general surgery resident training.

Acute Kidney Injury After Venous Pharmacomechanical Thrombolysis

Jacqee M. Stuhldreher, MD, Constantinos Constantinou, MD, Henry Baele, MD, Jerry Goldstone, MD, and Vikram Kashyap, MD. Vascular Surgery, Case Western, University Hospitals, Cleveland, Ohio

Background: Endovascular techniques, including thrombolysis and percutaneous mechanical thrombectomy (PMT), are being used with increased frequency to treat severely symptomatic venous thrombosis. Acute

kidney injury after pharmacomechanical thrombolysis has been reported, however the true incidence is unknown.

Case reports: An 18-year-old male athlete with Paget von Schroetter disease underwent PMT using the AngioJet device and thrombolysis with tissue plasminogen activator. Total PMT volume was 200 mL. Postoperatively, the patient developed hematuria, and elevated serum creatinine. Urine output was normal, and his creatinine slowly normalized without intervention. He successfully underwent first rib resection. A 42 year-old male with factor V Leiden and protein C and S deficiency, but normal preoperative serum creatinine, developed recurrent bilateral ileofemoral deep venous thromboses. He underwent "power pulse thrombolysis" using the AngioJet device, and subsequent catheter directed thrombolysis. Total PMT volume was 300 mL with additional infusion of tissue plasminogen activator. Intraoperative hematuria was noted, and postoperatively, the patient developed an acute increase in serum creatinine. Urine output was normal, and investigations regarding the etiology of the acute kidney injury were inconclusive. There were no laboratory signs of hemolysis, interstitial nephritis, or hemodynamically mediated kidney injury.

Conclusions: These two cases illustrate acute kidney injury after PMT and thrombolysis for venous thrombosis. PMT can lead to hemolysis in cases of high-volume injection and aspiration. In both patients, hematuria was present during or immediately after pharmacomechanical thrombolysis. Limiting PMT volume appears to ameliorate the risk of hemolysis, but in the patients presented, PMT using the AngioJet device was performed with <500 mL. As the use of endovascular techniques for thrombosis increases, further studies are needed to assess the relationship of PMT, postoperative hemolysis, and its impact on renal function. Vigilance of PMT volume and renal status in these patients appears warranted.

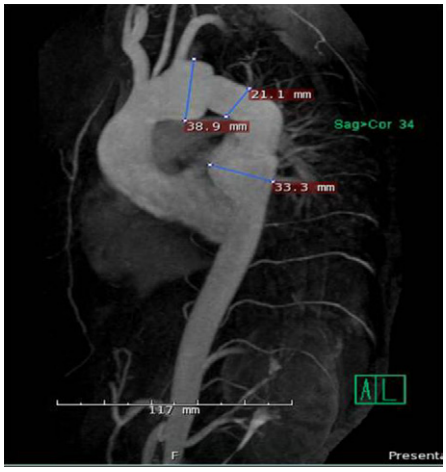

Fig. 1.

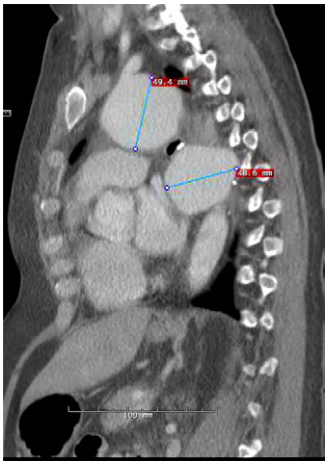

Fig. 2.

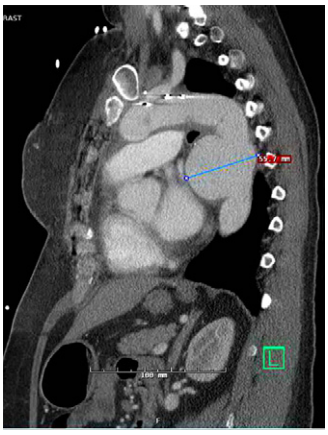

Fig 3.

Endovascular Abdominal Aortic Aneurysm Repair in Patients With Ventricular Assist Devices

Jean E. Starr, MD, Chittoor Sai-Sudhakar, MD, and Hamdy Elsayed-Awad, MD. Department of Surgery and Department of Anesthesia, The Ohio State University, Columbus, Ohio

Long-term mechanical circulatory support devices are currently an established therapy for the management of end-stage heart failure and current evidence supports their superiority compared with maximal medical therapy in these patients. Implantation of left ventricular assist devices (LVAD) as destination therapy in patients considered ineligible for heart transplantation has resulted in improved survival, quality of life, and functional status. Screening for peripheral arterial disease and abdominal aortic aneurysm (AAA) before LVAD implantation is recommended. Although repair of AAA before during LVAD placement has been reported, surveillance and management strategies of AAA after LVAD implantation need to be further investigated. We describe our surveillance program, management, and operative strategies in two patients on destination LVAD therapy who underwent successful endovascular AAA repair. Meticulous preoperative workup and counseling, with special attention to bridging of anticoagulation therapies and careful intraoperative monitoring, including the hemodynamic management of a nonpulsatile, continuous-flow system are critical to successful outcomes. Endovascular AAA repair is feasible in patients with destination LVAD therapy and should be considered in those with AAA and a reasonable life expectancy.

Third Time's the Charm: Repair of Complex Thoracic Aneurysm in a Patient with Relapsing Polychondritis

Peter JB Hunt, MD, Robert March, MD, Aksim Rivera, MD, Chad E. Jacobs, MD, and Walter J. McCarthy, MD. Department of Cardiovascular and Thoracic Surgery, Rush University Medical Center, Chicago, Ill

Objectives: This report describes the diagnosis and treatment of a complex thoracic aneurysm in a patient with relapsing polychondritis (RP).

Methods: Review of this rare disorder, its complications, and principles of thoracic aneurysm repair.

Results: A 29 year-old woman with a history of RP and open repair of a proximal descending thoracic aneurysm presented with hemoptysis and right lower lobe blastomycosis pneumonia. Chest computed tomography showed two areas of thoracic aneurysmal dilatation—at the ascending aorta/arch and the distal descending aorta, straddling the area of her previous open repair (Fig 1). The patient was initially treated conservatively, but returned 3 months later with symptomatic aneurysm expansion of the ascending/arch aneurysm. She therefore underwent ascending and aortic arch replacement with reimplantation of the arch vessels (Fig 2). She subsequently underwent endovascular repair of the distal descending thoracic aorta when the distal aneurysm expanded and became symptomatic (Figs 3 and 4). RP is a rare disease with an incidence of 3.5 per million individuals annually, <1% of whom develop aneurysmal disease. Antibodies to type II collagen are present in 50% to 60% of these, and there is an association with HLA-DR4. Areas most commonly affected include the auricular cartilage and the tracheobronchial tree. Medical management is aimed at immunosuppression via steroids and monoclonal antibodies (ie infliximab). First described in 1923 by Jaksch-Wartenhorst, thoracic aneurysm repair in these patients has been most recently described in 2006 by Caceres. To our knowledge this is the youngest reported patient with RP to require thoracic aneurysm repair; the only description of repair of both the ascending and descending aorta in a